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10/523,154	01/27/2005	Stefano Olivieri	IT 020022	8389

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EXAMINER	
VLAHOS, SOPHIA	

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/523,154	OLIVIERI, STEFANO
	Examiner	**Art Unit**
	SOPHIA VLAHOS	2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _17 July 2008_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-7_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-7_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _17 July 2008_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments see "Remarks" pages 6-10, filed 7/17/08, with respect to 35 U.S.C. 112 first paragraph rejections of claims 6-7 have been fully considered and are persuasive. The 35 U.S.C 112 first paragraph rejections of claims 6-7 have been withdrawn. An Art rejection of claims 6-7 has been included.

2. Applicant's arguments filed 7/17/08 have been fully considered but they are not persuasive.

Addressing the rejection of claim 1, (paragraph 2 of section "Claim Rejections under 35 U.S.C §103(a)"), Applicant argues:

"For example, the cited portions of Tong fail to disclose or suggest an element of claim 1, namely: ....a control unit for dynamically selecting a coding rate that is to be used by the encoder, wherein the encoder comprises: ....the interleaving and puncturing unit puncturing the interleaved parity symbols subsequent to said interleaving, **puncturing being controlled dynamically by the selected coding rate.** In contrast to claim 1, Tong discloses that **puncturing controls the coding rate,** which is in exact opposition to the underlined recitation of claim 1 (i.e., puncturing being controlled dynamically by the selected coding rate. The Office Action, at page 6, cites Tong at col. 5, lines 14-26 in view of FIG. 5, where it is stated, "where the puncturing performed by block 95 determines the coding rate." Therefore, the cited portions of

Tong fail to disclose or suggest puncturing being controlled dynamically by the selected coding rate, as in claim 1. The Office does not cite portions of Dotsch or Zhang for disclosing this element of claim 1."

Examiner Response:

Examiner disagrees that Tong, Dotsch and Zhang alone or in combination do not disclose or suggest the specific combination of claim 1. With respect to Tong disclosing that puncturing controls the coding rate, this is **incomplete** assessment of the Tong et al. reference.

The puncture unit shown in detail in Fig. 3 receives a P/R (Puncture /Repeat) control signal. This signal controls the puncture /repetition operation of the puncture unit to perform rate matching (i.e. to match the code rate of the encoder to the radio communication data rate, i.e. adapt the code rate of the encoder shown in Fig. 1).

With respect to Applicant's argument: "Therefore, the cited portions of Tong fail to disclose or suggest puncturing being controlled dynamically by the selected coding rate, as in claim 1. The Office does not cite portions of Dotsch or Zhang for disclosing this element of claim 1."

In the obviousness type rejection of claim 1, it was acknowledged that Tong et al. do not expressly teach: dynamically selecting a coding rate; puncturing being controlled dynamically by the selected coding rate. However, the secondary reference of Zhang is seen to disclose these limitations (Fig. 1, block 110 an adaptive controller selecting a coding rate of the puncture encoder block 112, column 2, lines 45-55, column 3, lines 6-

11) and the puncturing being controlled dynamically by the selected coding rate (column 2, lines 45-65, column 3, lines 44-64, see adaptive puncturing based on a channel quality measure).

In paragraph 3 of section "Claim Rejections under 35 U.S.C §103(a)", Applicant further argues:

"As a further point of distinction it is noted that Tong teaches that a puncturing function 95 is applied only to the channel-interleaved parity bit streams. *See* Tong at col. 10, lines 44-47. This is different from applying the puncturing function to an interleaved stream of parity and information bits, as recited in claim 1. Specifically, claim 1 recites an interleaving and puncturing unit <u>that interleaves the information symbols and parity symbols with a predetermined interleaving scheme</u> for protection against burst errors in the transmission signal, the interleaving and <u>puncturing unit puncturing the interleaved parity symbols **subsequent to said interleaving**</u>, puncturing being controlled dynamically by the selected coding rate."

<u>Examiner Response:</u>

With respect to the Tong reference teaching puncturing is applied only to the channel-interleaved parity bit streams, the last paragraph of claim 1 recites "...the interleaving and puncturing unit puncturing the interleaved parity symbols subsequent to said interleaving...". Therefore in claim 1 puncturing is performed only on interleaved

parity symbols, after interleaving of information and parity symbols, and Tong discloses puncturing of interleaved parity symbols (Fig. 5, block 95, receiving outputs of blocks 93 (for P! and P2 symbols), and the information symbols are also interleaved by block 93 (for the S symbols)).

Therefore the obviousness type rejection of claims 1-5 is maintained

Drawings

3. The drawings (Fig. 1 – Fig. 5) were received on 7/17/08. These drawings are acceptable.

Specification

4. The specification received on 1/27/05 is objected to for the following informalities: Page 8, last paragraph recites: “A rate control unit 546 controls error correction unit and de-interleaver **dependent on a puncture rate**..." The last paragraph of the specification (on page 9, lines 3-4) recites: “A predetermined de-interleaving scheme is used, **independent of the rate of puncturing**…” These two passages are contradictory, since the first one discloses control of an interleaver dependent on a puncture rate but the second one discloses the deinterleaver functioning independent of a rate of puncturing.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 3, 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tong et al. (U.S. 6,744,744) in view of Dötsch et al. (U.S. 6,513,140) and Zhang (U.S. 6,968,494).

With respect to claim 1, Tong et al., disclose: an encoder for encoding information according to an error protecting code (Fig. 5, see combination of blocks 90, the channel interleavers, and rate matching "turbo encoder" see convolutional coders, column 10, lines 18-21); a control unit for determining a coding rate that is to be used by the encoder (not shown in Fig. 3, circuit out of which "P/R" signal is generated determining whether repetition or puncturing is required in rate matching block 26 of Fig. 3, column 7, lines 65-67, column 8, lines 1-10, see column 3, lines 44-48, where the determined coding rate matches the data rate of the radio communications rate (depends on the available bandwidth), see also column 5, lines 14-26 and Fig. 5 where the puncturing performed by block 95 determines the coding rate), wherein the encoder comprises: an input for receiving information bits (Fig. 5, input data bits are supplied to the input of turbo coder, see column 10, lines 23-28); a parity bit generator for generating parity bits from the information bits (Fig. 5, see output of either encoder 1 P1 and/or encoder 2, P2, column 10, lines 23-28); an interleaving and puncturing unit (Fig.

5, channel interleavers and puncture block (also show in Fig. 3)) that interleaves the information bits and parity bits with a predetermined interleaving scheme for protection against burst errors in the transmission signal (column 10, lines 32-39, column 1, lines 53-55, where the interleaving protects against burst errors since it shuffles bits so that no single codeword is affected by burst noise and the receiver cannot decode it), the interleaving and puncturing unit puncturing the interleaved parity symbols subsequent to said interleaving, puncturing being controlled by the determined coding rate (see "P/R" control signal in rate matcher 26 as shown in Fig. 3, and Fig. 5, see column 3, lines 45-46, column 5, lines 14-26, column 10, lines 44-55, where the puncturing is controlled by the "P/R" based on the determined coding rate that matches the data rate (air rate)).

Tong et al. do not expressly teach: a modulator for modulating information from the encoder in a transmission signal; symbols; dynamically selecting a coding rate; puncturing being controlled dynamically by the selected coding rate;

In the same field of endeavor (RF communications), Dötsch et al. disclose: a modulator for modulating information from the encoder in a transmission signal (see column 7, lines 13); symbols (Fig. 1 turbo encoder , input U comprises unencoded symbols and R1 and R2 are redundancy symbols see Fig. 2 and column 6, lines 18-67, through column 7, lines 19);

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify Tong et al. based on the teachings of Dötsch et al so that turbo encoding is performed on symbols (groups of bits). Also at the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify Tong et al. so

that a modulator (is used) for modulating information from the encoder in a transmission signal, so that the information signal is modulated onto a property (frequency, phase, amplitude, polarization etc.) of a carrier signal i.e. the information signal is converted into a suitable format for transmission.

In the same field of endeavor (data communications), Zhang discloses: a control unit for dynamically selecting a coding rate that is to be used by the encoder (Fig. 1, block 110 adaptive controller selecting a coding rate of the puncture encoder block 112, see column 2, lines 45-55, column 3, lines 6-11, 44-64); puncturing being controlled dynamically by the selected coding rate (see column 2, lines 45-65, column 3, lines 44-64 where the puncturing is adaptive (dynamic) based on a channel quality measure).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify Tong et al. based on the teachings of Zhang so that an appropriate coding rate is selected based on a channel quality measure and a number of error correcting bits is adaptively adjusted (by control of the puncturing) in response to the channel quality measure to avoid unnecessary overhead for the receiver (Zhang column 1, lines 31-35).

With respect to claim 3, Tong et al., disclose: wherein the parity symbol generator comprises a first convolution encoder (see Fig. 5, “encoder 1” block 92, see column 10, lines 23- 27) and a pre-encoding interleaver coupled to the input (Fig. 5, “interleaver” block 91) and a second convolution encoder cascaded after the pre-encoding interleaver (Fig. 5, “encoder 2” cascaded behind block 91), the interleaving

and puncturing unit comprising a first post encoding interleaver, coupled to interleave the information symbols and an output of the first convolution encoder (Fig. 5, circuit portion comprising channel interleavers 93 for S and P1 corresponds to the claimed first post encoding interleaver), and a second post-encoding interleaver coupled to interleave an output of the second convolution encoder (Fig. 5, block 93 interleaver of P2), separate from the first post encoding interleaver.

Method claim 4 is rejected based on a rationale similar to the one used to reject claim apparatus 1 above.

7. Claims 2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tong et al. (U.S. 6,744,744) in view of Dötsch et al. (U.S. 6,513,140) and Zhang (U.S. 6,968,494) as applied to claims 1 & 5 above, and further in view of Farrell et al. (U.S. 6,643,331).

With respect to claim 2, Tong et al. Dötsch et al. and Zhang disclose: wherein the interleaving and puncturing unit comprises an interleaving memory (Fig. 3 see working memory 50), the parity symbol generator outputting the parity symbols into a first port of the interleaving memory (Fig. 3, see input to memory 50, linear addressed write-in column 6, lines 15-17, column 10, lines 31-35 where the channel interleavers (for the P1, P2 parity symbols, where a memory is understood to have an input (a first port) where information is supplied to for storage) function as the one shown in detail in Fig.

3); a subset of the generated and stored parity symbols being mapped to the modulation symbols (Fig. 3 of Tong et al. shows interleaving followed by puncturing (of interleaved data in the FIFO memory 65) since puncturing deletes data (symbols(the punctured output 76 supplied to a modulator only includes a subset of the generated and stored data (of working memory 50)) a size of the subset being controlled dynamically by the selected coding rate (Fig. 3, “P/R” control signal supplied to selector 66 determines whether puncturing takes place dynamically in response to channel quality measure as taught by Zhang).

Tong et al. Dötsch et al. and Zhang do not expressly teach: the modulator mapping the parity symbols to positions in modulation symbols according to the locations at which the parity symbols have been written into memory; reading and mapping being coordinated to result in interleaving of at least the parity symbols so that parity symbols and information symbols, normally associated with the same modulation symbol, are distributed over mutually separated modulation symbols; the subset being defined by selecting the locations that are mapped to positions in the modulation symbols.

In the same field of endeavor, Farrell et al. disclose: the modulator mapping the parity symbols to positions in modulation symbols (Fig. 3 through Fig 5 showing turbo encoder, its associated buffer and the mapping to modulation (constellation) symbols, see column 3, lines 1-65).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Tong et al. Dötsch et al. and Zhang based on the

teachings of Farrell et al., so that the modulator maps the parity symbols to positions in modulation symbols according to the locations at which the parity symbols have been written into memory the rationale being the modulation symbols comprise parity symbols (and information symbols as taught by Farrell). The symbol mapping is therefore clearly dependent on the initial supplying and writing of the symbols in the memory and the reading (that creates the interleaved symbols) as taught by Tong et al., as part of the process of mapping interleaved symbols into modulation symbols.

With respect to the limitations, reading and mapping being coordinated to result in interleaving of at least the parity symbols so that related parity symbols and information symbols are mutually separated modulation symbols; the subset being defined by selecting the locations that are mapped to positions in the modulation symbols., the system obtained by modifying Tong et al. Dötsch et al. and Zhang based on Farrell et al, discloses the above limitations. See that interleaving is applied to information and parity symbols (Fig. 5 of Tong et al.) and the modulator such as the one taught by Farrell e. al., creates modulation symbols using information and parity pairs (Table 1 on column 3) with related parity symbols and information symbols distributed over mutually separated modulation symbols (see Table 1 of Farrell where information/parity (d1p1 & d2q2) are paired to create constellation points which are mutually spaced apart (distributed over mutually separated modulation symbols or constellation points)). Finally with respect to the subset being defined by selecting the locations that are mapped to positions in the modulation symbols, the subset referring to the subset of parity symbols (since the generated parity symbols are punctured,

therefore a subset remains after puncturing) see column 8, lines 8-10 of Tong et al., where the punctured symbols are supplied to a buffer, and it is understood that the modulator accesses (selects) the buffer locations to generate the modulation symbols.

Claim 5 is rejected based on a rationale similar to the one used to reject claim 2 above.

8. Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiu et al. (U.S. 6,798,826) in view of Abe (U.S. 6,272,123).

With respect to claim 6, Shiu et al. disclose: a demodulator for demodulating information from a transmission signal (Fig. 1, part of block 134, column 3, lines 47-53); ; a de-interleaver comprising a memory (Fig. 8 buffer 822, (Fig. 8 comprises blocks 822, 824, column 16, lines 14-18), the de-interleaver writing the demodulated information into the memory according to a coding rate independent address scheme (column 17, table erasure insertion algorithm, is coding rate independent , skipping locations for parity bits that a control unit indicates to have been suppressed by puncturing (column 17, lines 13-50, where writing erasures in the memory in the place of punctured bits is equivalent to skipping locations for punctured parity bits, column 17, lines 15-45 shows that the erasure insertion algorithm is code rate independent and Fig. 11 shows blocks controller 1130 and address generator 1130 implementing the de-interleaving process, column21, lines 64-67, column 22, lines 1-3);

Shiu et al. do not expressly teach: a control unit for dynamically indicating a coding rate that has been used for encoding the transmission signal; determining an error correction unit for correcting errors in the demodulated information, the error correction unit being arranged to read the demodulated information from the memory in de-interleaved terms.

In the same field of endeavor, Abe discloses: a control unit for dynamically indicating a coding rate that has been used for encoding the transmission signal (Fig. 2, block 40 is a controller and information on line 63 (the line connected to blocks 57-58), dynamically indicates a coding rate that has been used for encoding the transmission signal, see column 8, lines 34-37 where the dynamic selection of error correcting decoder 57 or 58 by controller 40 corresponds to dynamically indicating a coding rate used at the transmitter since these decoders undo the encoding operation performed by error correcting encoders 42, 44 which have different encoding rates and one of them is selected to encode the transmission of data at a time, column 7, lines 18-23, 40-45, column 8, lines 20-26, 37-41, 47-53); determining an error correction unit for correcting errors in the demodulated information (Fig. 2 selection of one of the error correcting decoders by controller 40, column 8, lines 38-41), the error correction unit being arranged to read the demodulated information from the de-interleaver in de-interleaved terms (column 8, lines 30-38, the error correction unit receives (and read in order to decode) demodulated information (demodulation is a function of the RF receiving stage 21, column 5, lines 13-15) in de-interleaved (and punctured terms)).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Shiu et al. based on the teachings of Abe, so that bit sequences of higher importance are encoded using an error encoder with higher redundancy and at the receiver, the corresponding error correcting decoder is dynamically selected (based on coding rate information)(Abe, column 7, lines 32-45, column 8, lines 34-38).

With respect to the error correction unit being arranged to read the demodulated information from the memory in de-interleaved terms, see that the combination of Shiu et al. and Abe discloses the above limitation, since Shiu et al. shows that the de-interleaver comprises a memory (buffer) the contents of which are read by the error correcting decoder taught by Abe.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SOPHIA VLAHOS whose telephone number is (571)272-5507. The examiner can normally be reached on MTWRF 8:30-17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on 571 272 3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SOPHIA VLAHOS/
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10/29/2008

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